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PLANETARY PHENOMENA FOR JULY AND AUGUST, 1906.

By Malcolm McNeill.

PHASES OF THE MOON, PACIFIC TIME.

Full Moon	July 5,	8h 27m, p. m.	Full Moon	August 4	5h 00m a. m.
Last Quarter	July 14,	2h 13m, a. m.	Last Quarter	August 11,	6h 47m, p. m.
New Moon	July 21,	4h 59m, a. m.	New Moon	August 19,	5h 27m, p. m.
First Quarter	July 28,	11h 56m, a. m.	First Quarter	August 26,	4h 42m, p. m.

The Earth passes the aphelion point and reaches its farthest distance from the Sun on the night of July 23rd, about midnight, Pacific time.

There will be three eclipses during July and August. As is always the case when three eclipses occur in so brief a time, the first and third will be eclipses of the Sun, and the second an eclipse of the Moon.

The first, a partial eclipse of the Sun, will occur in the early morning of July 21st, Pacific time, and will be visible in far southern latitudes only.

The second is a total eclipse of the Moon, on August 4th, The beginning will be visible in the central and western portions of North America, and the eastern portions of Asia, and Australia, and the ending will be visible in Alaska and through Asia and Australia. The middle of totality will come at 5h. 1m. a.m. Pacific time, and the beginning and end of totality not quite an hour before and after that time. For the western part of the United States the Moon will set and the Sun will rise during totality.

The third is a partial eclipse of the Sun, on the afternoon of August 19, Pacific time. The eclipse will be visible mainly in the north polar regions, but it may be seen as a very small partial eclipse late in the afternoon in that part of the United States west of the Missouri and north of 40° latitude. The maximum obscuration is about one-third of the Sun's diameter and in regions far north of the United States. As seen from any part of the United States, the maximum obscuration will be much less.

At the beginning of July, *Mercury* is an evening star, setting an hour and one-half after sunset, and the interval is more than an hour until well after the middle of the month. So the first half of July affords the best opportunity of the year for seeing the planet as an evening star. The greatest east elongation, 26° 39′ is reached on July 15th, and is much above the average as the planet reaches its aphelion only a few days later. The southerly motion of the planet after greatest elongation and the fact that it is in the portion of the orbit south of the ecliptic cause a rapid diminution of the interval between the setting of the Sun and of the planet, and it can be seen only a few days after the middle of July. It passes inferior conjunction with the Sun and becomes a morning star on August 12th, It then moves rapidly toward greatest west elongation (18° 12') and reaches this point on August 29th. It then rises an hour and one-half before sunrise, and it will be an easy object to see in the morning twilight for a week or so before and after the end of August.

Venus is an evening star setting a little more than two hours after sunset on July 1st, and less than an hour and three-fourths after on August 31st. It is still increasing in apparent distance from the Sun and will continue to do so until September 20th, but its motion among the stars is along a line farther and farther to the south of the Sun's position and this causes a hastening of the time of setting, which more than counterbalances the retardation due to increase of apparent distance from the Sun.

Mars is still an evening star on July 1st, but is too near the Sun to be seen. It passes conjunction with the Sun and becomes a morning star on July 15th, but does not move far enough away to be seen in the morning sky until nearly the end of August. It does not reach its maximum distance from the Earth until a fortnight after conjunction, since it is still receding from the Sun and will not reach its aphelion until the middle of October.

Jupiter is a morning star rising about an hour before sunrise on July 1st, and shortly after midnight on August 31st. It moves about 13° eastward among the stars from the eastern part of *Taurus* into *Gemini,* and at the end of August is south and west of *Castor* and *Pollux,* the brightest stars of the latter constellation.

Saturn is getting around into fair position for evening observation. It rises at about 11 P.M. on July 1st, and shortly before 7 P.M. on August 31st. It will reach opposition early in September. Its motion during the two months' period is westward and southward about 3° nearer the boundary line between *Aquarius* and *Pisces.* There are no bright stars near it.

Uranus rises shortly after 7 P.M. on July 1st, having passed opposition with the Sun on June 28th. By the end of August it rises about three P.M. It is therefore well up in the southeastern sky by the time twilight has disappeared. It is in the constellation *Sagittarius* and moves about 2° westward during the period. During August it is about 2° north of *Lambda Sagittarii,* the third magnitude star in the handle of the milk dipper. It is just within the limit of naked eye visibility for ordinary eyes on clear moonless night.

Neptune passes conjunction with the Sun on July 2d, and becomes a morning star. It is in the western part of *Gemini.*